Electronic Version
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Claims

[c1] What is claimed is:

1.A method of forming a barrier layer comprising:

(a)providing a substrate having at least a plug hole;

(b)performing a chemical vapor deposition (CVD) process for forming a Ti/TiN film, functioning as the barrier layer, onto the substrate and inner walls of the plug hole;

(c)performing an examination procedure, and if particles are detected in the barrier layer, then performing step (d); and

(d)performing a rework procedure comprising:

performing an etching process to remove the barrier layer;

scrubbing the substrate with a scrubber machine for removing the particles;

rinsing the substrate with a cleaning solution; and

performing another CVD process for forming another Ti/TiN film onto the inner walls of the plug hole.

[c2] 2.The method of claim 1 wherein the etching process is a wet etching process.

[c3] 3.The method of claim 2 wherein the wet etching pro-

cess is implemented with an acid solution comprising phosphoric acid (H_3PO_4), nitric acid (HNO_3), acetic acid (CH_3COOH), and water (H_2O).

[c4] 4.The method of claim 3 wherein the ratio of phosphoric acid, nitric acid, acetic acid, and water in the acid solution is between (38-41):(1-1.5):(1.8-2.1):(2.8-3.2).

[c5] 5.The method of claim 1 wherein the cleaning solution is a sulfuric acid (H_2SO_4) solution.

[c6] 6.The method of claim 1 wherein the examination procedure is performed for detecting the particles that influence electrical property.

[c7] 7.A method of forming a barrier layer comprising:
(a)providing a substrate having at least a conducting layer thereon;
(b)performing a chemical vapor deposition (CVD) process for forming a barrier layer onto the conducting layer;
(c)performing an examination procedure, and if particles are detected in the barrier layer, then performing step (d); and
(d)performing a rework procedure comprising:
performing an etching process to remove the barrier layer;
scrubbing the substrate with a scrubber machine for re-

moving the particles;

rinsing the substrate with a cleaning solution; and

performing another CVD process for forming another barrier layer onto the conducting layer.

[c8] 8.The method of claim 7 wherein the barrier layer is a Ti/TiN film.

[c9] 9.The method of claim 7 wherein the conducting layer is a polysilicon layer.

[c10] 10.The method of claim 7 wherein the conducting layer is a silicide layer.

[c11] 11.The method of claim 7 wherein the conducting layer is a metal layer.

[c12] 12.The method of claim 7 wherein the etching process is a wet etching process.

[c13] 13.The method of claim 12 wherein the wet etching process is implemented with an acid solution comprising phosphoric acid (H_3PO_4), nitric acid (HNO_3), acetic acid (CH_3COOH), and water (H_2O).

[c14] 14.The method of claim 13 wherein the ratio of phosphoric acid, nitric acid, acetic acid, and water in the acid solution is between (38-41):(1-1.5):(1.8-2.1):(2.8-3.2).

[c15] 15.The method of claim 7 wherein the cleaning solution is a sulfuric acid.